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ULNAR DRIFT
REPORT OF A RELATED FINDING

By

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Much controversy has surrounded the etiology of ulnar drift in the rheumatoid hand. As *Brewerton* (1957) notes, one of the primary reasons for studying ulnar drift is the failure in understanding its cause. Many have felt that gravity plays an important role. *Fearnley* (1951) has felt that use of the hand in an abnormal manner combined with normal ulnar tendency with metacarpal phalangeal flexion and greater mobility of the metacarpal phalangeal joints secondary to arthritic involvement is primarily responsible. *Lush* (1952) has felt that functional rather anatomical origin seems to fit the observed facts. Flatt has agreed with Lush, saying that the pressure of usage and laxity of tissues secondary to disease are the most important factors. *Vainio & Oka* (1953) have concluded that relaxation of the collateral ligaments owing to rheumatoid inflammation, coupled with the small activities of daily living is at fault. *Henderson & Lipscomb* (1961) have listed stretching of the radial transverse fibers of the extensor aponeurosis, habitual use of the hand in a seal flipper's position, and displacement of the line of pull of the long extensor and flexor tendons as causes. *Smith, Juvinall, Bender & Pearson* (1964) have implicated the flexor tendons primarily. *Boyes* (1964) states that spasticity of the muscles inserting into the wings of the extensor assembly is probably the primary cause of ulnar drift, with the tension of an intact long extensor mechanism being of secondary factor.

The present paper reports on a previously almost totally unrecognized finding in the rheumatoid patient with ulnar phalangeal drift. The

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purpose of this paper is to show this finding and its possible relationship to the development of ulnar drift. The finding is a radial deviation of the metacarpals accompanied by a radial rotation of the wrist.

MATERIALS

The serial postero-anterior x-rays of five hands in four patients from the x-ray files of the Rheumasaation Sairaala (Rheumatism Foundation Hospital) Heinola, Finland, have been selected because of the clear manner in which they show this phenomena.

For the last fifteen years x-rays of the hands at this hospital have been taken in a consistant, routine manner. Both hands, with the palms lightly pressed against a twenty-four by thirty centimeter non-screen film. A standardized one hundred centmeter focus-film distance is used and the median ray is directed at the center point of the film with both palms placed symmetrically in regard to centerline and to the center of their own side of the film. Despite such standardization, slight positional differences in the placement of the individual phalanges is possible.

All cases have had follow-up x-rays taken at least six years after the original film. The duration between the first and final films averaged 9.4 years, the longest duration being fourteen years and the shortest, six years. As many as four films have been taken over these periods of time (Table 1).

Table 1.

Case and hand	Sex	Age when 1st x-rayed	X-ray year and measured angle 1	2	3	4	Total years Followup
1. E.L. Right	♀	43	1955–113°	1962–123°	1966–143°		11 years
2. G.K. Left	♀	17	1956–108°	1961–128°	1962–130°	1962–127°	6 years
3. G.K. Right	♀	17	1956–114°	1961–133°	1962–130°	1962–130°	6 years
4. A.O. Left	♂	56	1956–120°	1962–131°	1966–138°		10 years
5. A.O. Right	♀	27	1952–113°	1962–133°	1966–147°		14 years
						Average	9.4 years

METHOD OF MEASUREMENT

In measuring the x-ray films, the following co-ordinates have been used. A line has been drawn in the longitudinal axis of the second metacarpal shaft along the radial cortex. A second line has been drawn from the tip of the radial styloid, at the

radial limit of articular surface, to the ulnar limit of the articular surface on the volar side of the distal radius. The obtuse angle thus formed has been measured and recorded. These coordinates have been used primarily because they could be found quite readily on every x-ray examined. In all cases, a five degree change in angle has been considered to lie within the measurable error.

CASE REPORTS

Case One. E.L., a female, was forty-three years old when first x-rayed in 1955. The original angle measured 113° on the right wrist with no wrist rotation or phalangeal drift. Metacarpal phalangeal joint narrowing and erosions were seen in x-rays two, three, and four as well as narrowing and early erosions in the carpus. X-ray number two, taken in 1962, revealed the angle to be 123°. The narrowing and erosions had progessed. There is a suggestion of ulnar phalangeal drift at the metacarpal phalangeal joints. X-ray number three, taken in 1966, showed the angle to have increased to 143°. There is now severe drift of the fingers.

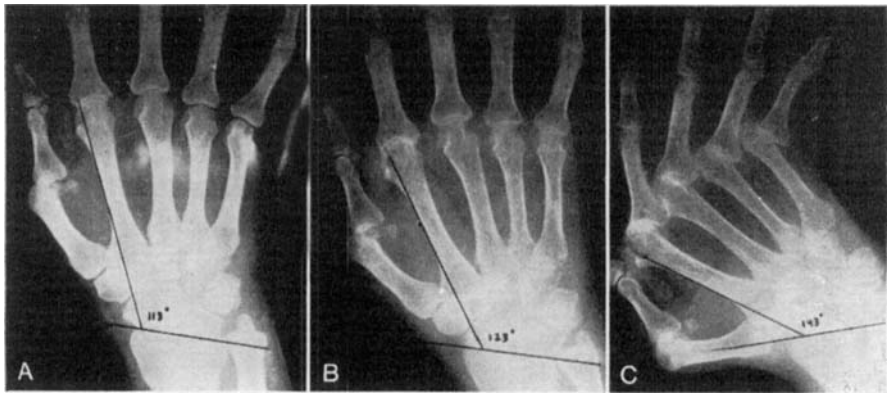

Figure 1. A) Case One, E.L. Original angle of 113° in 1954.
Figure 1. B) Case One, E.L. 1962 x-ray. Angle now measures 123°
Carpal rotation has occurred.
Figure 1. C) Case One, E.L. 1966 x-ray. Angle now 143°.
Severe phalangeal drift now present.

Cases Two and Three. G.K., a female, was seventeen years old when first x-rayed in September, 1956. On that film, the left and right hands measured 108° and 114°, respectively. No joint narrowing, erosions, or phalangeal ulnar drift were noted. X-ray number two, taken in August, 1961, revealed the left and right angles to be 128° and 133°, respectively. Joint narrowing was present in the carpus and metacarpal phalangeal joints but there was no evidence of erosions at the metacarpal phalangeal joints on either side. Both wrists had rotated radially and there was early evidence of phalangeal drift of the second, third and fourth phalanges of the left hand. No ulnar drift was noted on the right. The third x-ray, taken May, 1962, revealed the left and right angles to be 130° bilaterally. The metacarpal phalangeal and carpal

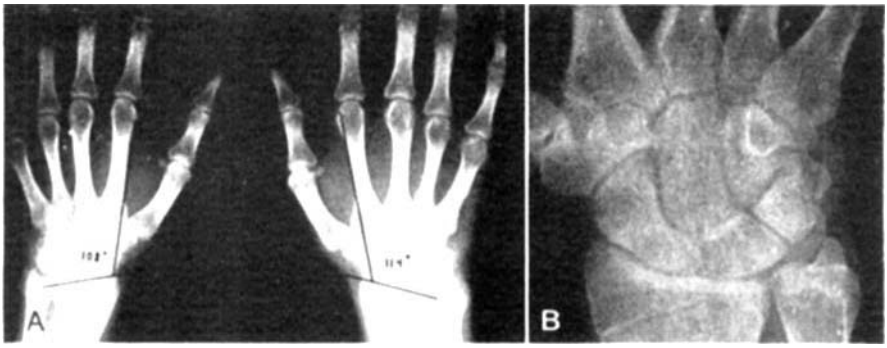

Figure 2. A) Case Two, and three, G.K. Original x-ray of September, 1956. Angles are 108° on left and 114° on right.
Figure 2. B) Case Two, and Three, G.K. Closeup of wrist in 1956.

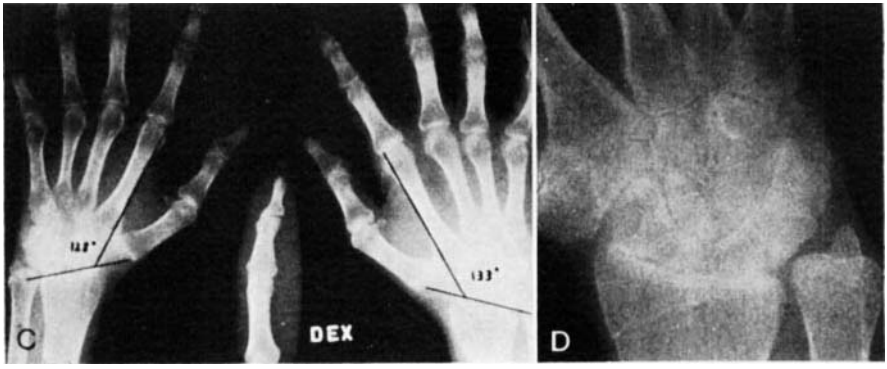

Figure 2. C) Case Two, and Three, G.K. August, 1961. Left: 128°. Right: 133°. Bilateral wrist rotation has occurred. Early phalangeal drift is noted on the left.
Figure 2: D) Case Two, and Three, G.K. Closeup of right wrist in 1961 showing rotation.

joints showed no erosions but were narrow. The wrists were severely rotated radially and there was definite ulnar phalangeal drift on the left side, but none of note on the right. Five months later, in the film taken in October, 1962, both sides showed marked ulnar drift at the metacarpal phalangeal joints. The measured angles were 127° on the left side and 130° on the right. (This patient was found to have systemic lupus erythematosus as well as rheumatoid arthritis. She died in 1963).

Case Four. A.O., a male, was fifty-six years old when first x-rayed in 1956. The angle measured 120°. This film showed narrowing and erosion of the second metacarpal phalangeal joint. There was mild wrist rotation and no phalangeal drift. X-ray number two, taken in 1962, revealed the wrist rotation to have become severe, the angle measuring 131°. Narrowing and erosion of the second metacarpal phal-

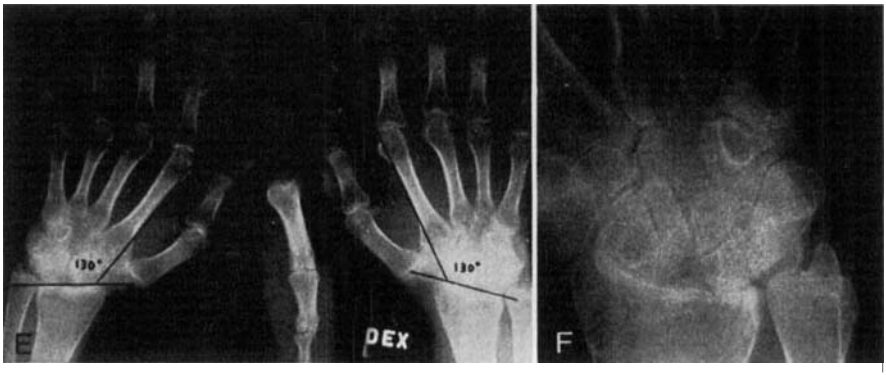

Figure 2. E) Case Two, and Three, G.K. May, 1962. Left: 130°. Right: 130°. Phangeal drift is now prominent on left.
Figure 2. F) Case Two, and Three, G.K. Closeup of right wrist in May, 1962.

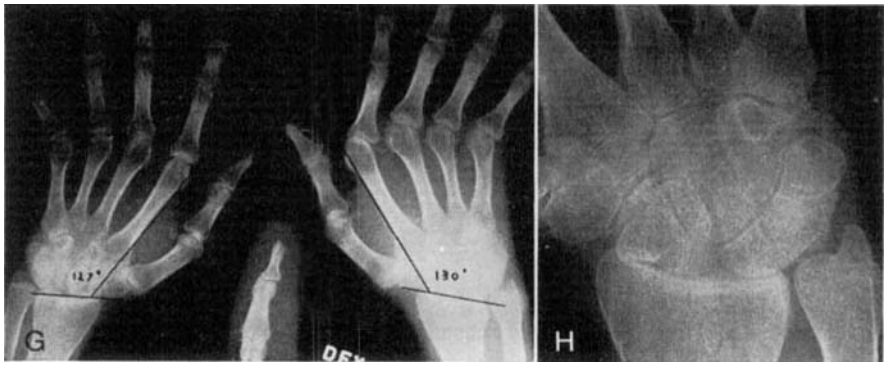

Figure 2. G) Cases Two, and Three, G.K. October, 1962. Left: 127°. Right: 130°.
Figure 2. H) Case Two, and Three, G.K. Closeup of right wrist in October, 1962.

angeal joint has progressed with erosions now present at the metacarpal phalangeal joints of rays two, three, and four as well as changes in the carpus. No phalangeal drift. X-ray number three, taken in 1966, revealed marked wrist rotation with an angle measuring 138°. Joint erosions had progressed. Marked ulnar phalangeal drift with subluxation had occurred.

Case Five. A.O., a female, was twenty-seven years old when first x-rayed in 1952. (This film was taken before the present x-ray standards were adopted for taking hand films. The major difference was that a thirty by thirty centimeter film was used.) The angle measured 113° on the right wrist, with early evidence of radiocarpal joint destruction. No phalangeal drift or wrist rotation was noted. X-ray number two, taken in 1962, revealed radiocarpal and metacarpal phalangeal joint destruction with erosions and narrowing together with apparent subluxation of the

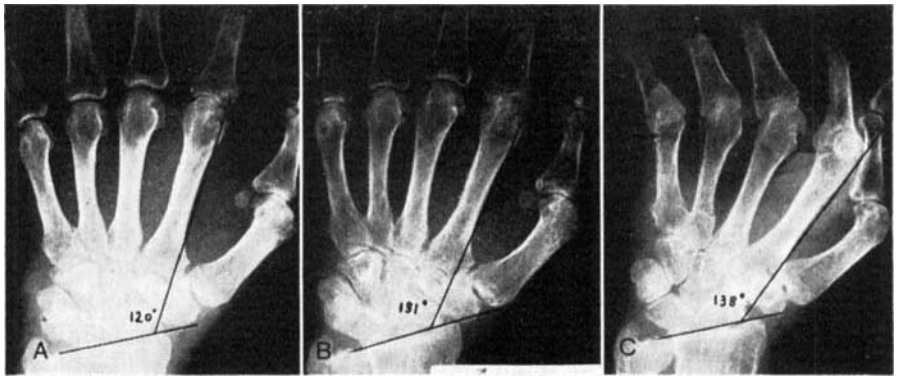

Figure 3. A) Case Four, A.O. Original x-ray in 1956 measures 120°.
Figure 3. B) Case Four, A.O. 1962 x-ray measures 131°.
Wrist rotation and metacarpal deviation is severe.
Figure 3. C) Case Four, A.O. 1966 x-ray measures 138°.
Ulnar phalangeal drift has occurred.

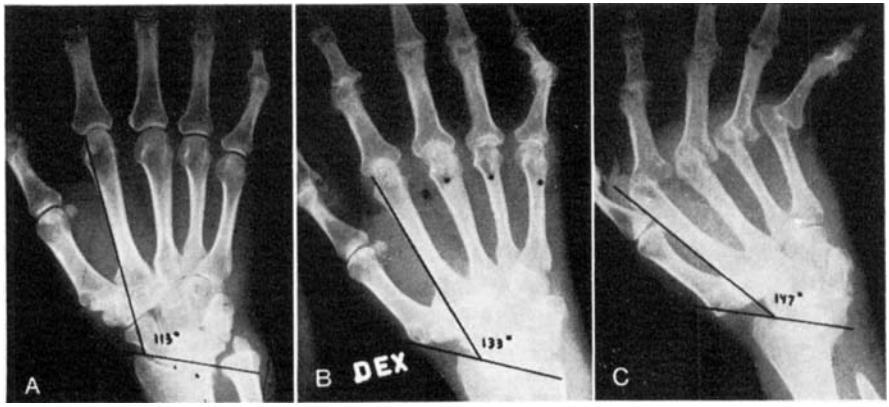

Figure 4. A) Case Five, A.O. 1952 x-ray. The angle measures 113°.
Early evidence of radio-carpal destruction has already occurred.
Figure 4. B) Case Five, A.O. 1962 x-ray. Angle measures 133°. Rotation and radial deviation has occurred with marked joint destruction. No phalangeal drift.
Figure 4. C) Case Five, A.O. 1966 x-ray. Angle measures 147°.
Severe ulnar phalangeal drift has occurred.

metacarpal phalangeal joints of rays two and three. The angle measured 133° with no phalangeal drift. X-ray number three, taken in 1966, showed the angle now to be 147° with apparent ankylosis at the radio-carpal joint and severe ulnar phalangeal drift accompanied by subluxation or total luxation at metacarpal phalangeal joints two, three, four and five.

DISCUSSION

The above examples were but several of many more such cases showing the radial wrist rotation in patients with ulnar phalangeal drift. They were found incidentally in a study by Vainio, Girzadas, and Shapiro on the natural course of the rheumatoid hand. Not all cases showed the time sequence so well as these five cases, but the finding of radial wrist rotation in association with ulnar phalangeal drift was striking.

A search of the literature revealed only one paper in which the co-occurrence of there two phenomena had been mentioned. In the Proceedings of the 1965 Australian Orthopedic Association, in a topic entitled "Surgery of the Rheumatoid Hand", the following appears: "Mr. P. Millroy (Brisbane) reviewed fifty operations ... The importance of the constant radial deviation at the wrist joint in the treatment of ulnar drift of the fingers was emphasized ... Mr. R. Tinning (Sydney) did not agree that radial deviation of the wrist caused ulnar drift of the fingers".

The present case-reports tend to support the premise that radial deviation at the wrist is an almost constant finding in patients with ulnar phalangeal drift and, moreover, that such deviation appears to precede the drift in almost all cases.

SUMMARY AND CONCLUSIONS

The serial postero-anterior x-rays of five hands in four patients with rheumatoid arthritis have been reviewed. The finding of a radial rotation of the carpus is pointed out. The relationship between this finding and ulnar phalangeal drift in the rheumatoid is emphasized.

RESUME

Une série de radiographies postéro-antérieures de cinq mains chez quatre malades souffrant d'arthrite rhumatoïde a été réexaminée. On souligne la trouvaille d'une rotation radiale du carpe. Le rapport entre cette trouvaille et la déviation phalangienne en direction du cubitus est soulignée.

ZUSAMMENFASSUNG

Die röntgenologischen postero-anterioren Serienbilder von fünf Händen von vier Patienten mit rheumatischer Arthritis wurden durchgesehen. Der Befund einer radialen Drehung der Handwurzel wird aufgezeigt.

Die Beziehung zwischen diesem Befund und der ulnaren Ablenkung der Phalangen beim Rheumatiker wird hervorgehoben.

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